



Application  
Number

SEARCH

IDS Flag Clearance for Application

10511957

IDS  
Information

Content	Mailroom Date	Entry Number	IDS Review	Reviewer
M844	07-19-2005	11	<input checked="" type="checkbox"/>	08-26-2005 09:14:57 dmartin

UPDATE

## Refine Search

### Search Results -

Term	Documents
ANTENNA	363890
ANTENNAS	85613
(22 AND ANTENNA).PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	30
(L22 AND ANTENNA ).PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	30

Database:

US Pre-Grant Publication Full-Text Database  
 US Patents Full-Text Database  
 US OCR Full-Text Database  
 EPO Abstracts Database  
 JPO Abstracts Database  
 Derwent World Patents Index  
 IBM Technical Disclosure Bulletins

Search:

L23

Refine Search

Recall Text

Clear

Interrupt

### Search History

DATE: Saturday, May 20, 2006    [Printable Copy](#)    [Create Case](#)

<u>Set Name</u>	<u>Query</u>	<u>Hit Count</u>	<u>Set Name result set</u>
<i>DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
<u>L23</u>	L22 and antenna	30	<u>L23</u>
<u>L22</u>	L19 and (rf adj coil)	75	<u>L22</u>
<u>L21</u>	L18 and (balun or half near wavelength) and (transmit\$4 or receive\$4) near (split\$4 or combin\$4) and (coaxial near delay)	0	<u>L21</u>
<u>L20</u>	L18 and (balun or half near wavelength) and (transmit\$4 or receive\$4) and (split\$4 or combin\$4) and (coaxial near delay)	0	<u>L20</u>
<u>L19</u>	L18 and (balun or half near wavelength) and (transmit\$4 or receive\$4) or (split\$4 or combin\$4) and (coaxial near delay)	288	<u>L19</u>

<u>L18</u>	L17 and L14	1342	<u>L18</u>
<u>L17</u>	L16 and L15 and L14 and L13	1342	<u>L17</u>
<u>L16</u>	(324/300-324 or 600/117,407,410,411,422, 423,424 or 330/210,295).ccls.	14358	<u>L16</u>
<u>L15</u>	(balun or half near wavelength) and (transmit\$4 or receive\$4) or split\$4 or combin\$4 or (coaxial near delay)	3051923	<u>L15</u>
<u>L14</u>	(decoupl\$4 or demodulat\$4) and (anrenna or coil)	36221	<u>L14</u>
<u>L13</u>	(magnetic adj resonance) or MRI or nmr	226587	<u>L13</u>
<u>L12</u>	5144244	14	<u>L12</u>
<u>L11</u>	4801885	14	<u>L11</u>
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
<u>L10</u>	'4920318'.pn.	1	<u>L10</u>
<u>L9</u>	'4920318'.pn.	1	<u>L9</u>
<i>DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
<u>L8</u>	4920318	58	<u>L8</u>
<i>DB=USPT; PLUR=YES; OP=ADJ</i>			
<u>L7</u>	'5964705'.pn.	1	<u>L7</u>
<u>L6</u>	'5964705'.pn.	1	<u>L6</u>
<u>L5</u>	'6263229'.pn.	1	<u>L5</u>
<u>L4</u>	'6263229'.pn.	1	<u>L4</u>
<i>DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>			
<u>L3</u>	6263229	54	<u>L3</u>
<u>L2</u>	wo000025673.pn.	0	<u>L2</u>
<u>L1</u>	wo000025673	0	<u>L1</u>

END OF SEARCH HISTORY

## Hit List

[First Hit](#)[Clear](#)[Generate Collection](#)[Print](#)[Fwd Refs](#)[Bkwd Refs](#)[Generate OACS](#)

Search Results - Record(s) 1 through 30 of 30 returned.

☐ 1. Document ID: US 6898454 B2      Relevance Rank: 56

Using default format because multiple data bases are involved.

L23: Entry 12 of 30

File: USPT

May 24, 2005

US-PAT-NO: 6898454

DOCUMENT-IDENTIFIER: US 6898454 B2

TITLE: Systems and methods for evaluating the urethra and the periurethral tissues

DATE-ISSUED: May 24, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Atalar; Ergin	Columbia	MD		
Quick; Harald Hartmann	Essen-Werden			DE
Karmarkar; Parag	Elliot City	MD		

US-CL-CURRENT: 600/410

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	Form	Draw G
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☐ 2. Document ID: US 6608480 B1      Relevance Rank: 50

L23: Entry 17 of 30

File: USPT

Aug 19, 2003

US-PAT-NO: 6608480

DOCUMENT-IDENTIFIER: US 6608480 B1

TITLE: RF coil for homogeneous quadrature transmit and multiple channel receive

DATE-ISSUED: August 19, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Weyers; Daniel J.	Wauwatosa	WI		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
GE Medical Systems Global Technology						

## Hit List

[First Hit](#)[Clear](#)[Generate Collection](#)[Print](#)[Fwd Refs](#)[Bkwd Refs](#)[Generate OACS](#)

Search Results - Record(s) 1 through 14 of 14 returned.

☐ 1. Document ID: US 5144244 A      Relevance Rank: 99

**Using default format because multiple data bases are involved.**

L11: Entry 10 of 14

File: USPT

Sep 1, 1992

US-PAT-NO: 5144244

DOCUMENT-IDENTIFIER: US 5144244 A

TITLE: Error-proof decoupling of transmission and reception antennas in a nuclear magnetic resonance apparatus

DATE-ISSUED: September 1, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kess; Helmut	Erlangen			DE

US-CL-CURRENT: 324/322; 324/318

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	PMC	Draw D
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☐ 2. Document ID: US 5260658 A      Relevance Rank: 96

L11: Entry 7 of 14

File: USPT

Nov 9, 1993

US-PAT-NO: 5260658

DOCUMENT-IDENTIFIER: US 5260658 A

TITLE: Detuning circuit for resonators in a nuclear magnetic resonance imaging apparatus

DATE-ISSUED: November 9, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Greim; Helmut	Adelsdorf			DE
Ruhl; Juergen	Erlangen			DE
Oppelt; Ralph	Weiher			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Siemens Aktiengesellschaft	Munich			DE	03

APPL-NO: 07/802542 [PALM]  
DATE FILED: December 5, 1991

## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	4039409	December 10, 1990

INT-CL-ISSUED: [05] G01B 33/20

US-CL-ISSUED: 324/322

US-CL-CURRENT: 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/300, 324/307, 324/309, 324/318, 324/322, 128/653.5

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4801885</u>	January 1989	Meissner et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0317090	May 1989	EP	
0389868	March 1990	EP	
3133432	March 1983	DE	

## OTHER PUBLICATIONS

"Human in Vivo Phosphate Metabolite Imaging with <sup>31</sup>P NMR" Bottomley et al., Magnetic Resonance in Medicine 7 (1988) pp. 319-336.

"Taschenbuch der Hochfrequenztechnik," Meinke et al. (1956) pp. 185-187.

Patent Abstracts of Japan, P-453 vol. 10, No. 119, May 6, 1986, Application No. 59-103380.

ART-UNIT: 267

PRIMARY-EXAMINER: Tokar; Michael J.

ATTY-AGENT-FIRM: Hill, Steadman & Simpson

## ABSTRACT:

A circuit for detuning a resonator in a nuclear magnetic resonance imaging apparatus has an output connected to a terminal of the resonator via a high-

frequency line composed of two conductors. The resonator is shortened at this terminal with a shorting capacitor that can be short-circuited for detuning the resonator. The length of the high-frequency line is shorter than one-fourth of the wavelength of a high-frequency signal having the operating frequency of the nuclear magnetic resonance imaging apparatus on the high-frequency line. For detuning the resonator the high-frequency line can be terminated at the output with a further capacitor, so that the high-frequency line acts as a short-circuit at the terminal.

8 Claims, 2 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KIM	Draw D
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☐ 3. Document ID: US 5294886 A      Relevance Rank: 96

L11: Entry 6 of 14

File: USPT

Mar 15, 1994

US-PAT-NO: 5294886

DOCUMENT-IDENTIFIER: US 5294886 A

TITLE: Antenna system for a magnetic resonance imaging tomography apparatus

DATE-ISSUED: March 15, 1994

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Duerr; Wilhelm	Erlangen			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Siemens Aktiengesellschaft	Munich			DE	03

APPL-NO: 07/872100      [PALM]

DATE FILED: April 22, 1992

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	4113120	April 22, 1991

INT-CL-ISSUED: [05] G01R 33/00

US-CL-ISSUED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 333/24R, 333/181, 343/743, 324/300, 324/307, 324/309, 324/310, 324/311, 324/312, 324/313, 324/314, 324/318, 324/322  
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4680550</u>	July 1987	Krause	324/318
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4922204</u>	May 1990	Duerr et al.	324/322
<u>4945321</u>	July 1990	Oppelt et al.	333/119
<u>5200703</u>	April 1993	Popp et al.	324/322

ART-UNIT: 267

PRIMARY-EXAMINER: Tokar; Michael J.

ATTY-AGENT-FIRM: Hill, Steadman &amp; Simpson

## ABSTRACT:

In a magnetic resonance imaging tomography apparatus having a transmission antenna for exciting nuclear spins in an examination subject, and a reception antenna in the form of a local coil, the feeder for the local coil is provided with decoupling elements. The decoupling elements prevent a coupling of the electrical field of the transmission antenna with the feeder for the local coil.

9 Claims, 5 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	Draw	Draw
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☐ 4. Document ID: US 6084410 A Relevance Rank: 96

L11: Entry 3 of 14

File: USPT

Jul 4, 2000

US-PAT-NO: 6084410

DOCUMENT-IDENTIFIER: US 6084410 A

TITLE: Tunable radio-frequency unit for a magnetic resonance device

DATE-ISSUED: July 4, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nistler; Juergen	Erlangen			DE

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Siemens Aktiengesellschaft	Munich			DE	03

APPL-NO: 09/098425 [PALM]

DATE FILED: June 17, 1998



## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	298 04 339 U	March 11, 1998

INT-CL-ISSUED: [07] G01V 3/00

US-CL-ISSUED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/311, 324/307, 324/316

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4739271</u>	April 1988	Haase	324/322
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4901022</u>	February 1990	Keren et al.	324/322
<u>4910461</u>	March 1990	Van Vaals	324/318

ART-UNIT: 282

PRIMARY-EXAMINER: Oda; Christine

ASSISTANT-EXAMINER: Shrivastav; Brij B.

ATTY-AGENT-FIRM: Hill &amp; Simpson

## ABSTRACT:

A tunable radio-frequency unit for a magnetic resonance device has a radio-frequency antenna and a radio-frequency signal line connected to a signal terminal of the radio-frequency antenna. The length of the radio-frequency signal line corresponds to a whole-number multiple of a half-wavelength of a radio-frequency signal on the radio-frequency signal line, for a given operating frequency of the radio-frequency antenna. For switching a short circuit on and off, a switching arrangement is connected at an end of the signal line lying opposite the signal terminal.

7 Claims, 2 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMC	Draw	Doc
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☐ 5. Document ID: EP 262495 A, US 4801885 A, EP 262495 B, DE 3771630 G  
Relevance Rank: 93

L11: Entry 14 of 14

File: DWPI

Apr 6, 1988

DERWENT-ACC-NO: 1988-093041  
DERWENT-WEEK: 199618  
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TITLE: Nuclear spin resonance device for measuring spectra or images - examines objects using quarter wavelength and coaxial lines for decoupling antenna and coil, and causes antenna to emit HF pulses

INVENTOR: KESS, H; MEISSNER, R

PATENT-ASSIGNEE: SIEMENS AG (SIEI)

PRIORITY-DATA: 1986DE-3632137 (September 22, 1986)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<u>EP 262495 A</u>	April 6, 1988	G	009	
<u>US 4801885 A</u>	January 31, 1989		007	
<u>EP 262495 B</u>	July 24, 1991		000	
<u>DE 3771630 G</u>	August 29, 1991		000	

DESIGNATED-STATES: DE GB NL DE GB NL

CITED-DOCUMENTS:2.Jnl.Ref; DE 3427666 ; EP 164164 ; EP 170514 ; GB 2153086 ; GB 2161940 ; 1.Jnl.Ref ; JP 59070950

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
EP 262495A	September 11, 1987	1987EP-0113338	
US 4801885A	September 16, 1987	1987US-0097738	

INT-CL (IPC): G01N 24/04; G01R 33/20

ABSTRACTED-PUB-NO: EP 262495A  
BASIC-ABSTRACT:

Coils apply base and gradient fields to the object under investigation. A whole body antenna (9) irradiates the object with a sequence of high frequency pulses. The nuclear resonance signals emitted by the body are detected by a surface coil. The antenna and surface coil are mutually decoupled. A quarter-wavelength line (20) is connected to the antenna (9) via a coaxial cable (22,23).

The end of the line is short-circuited when HF pulses are emitted by the antenna and is open when nuclear resonance signals are received by the surface coil. The coaxial line transforms the high impedance of the whole body antenna to a low level.

USE/ADVANTAGE - For investigating individual regions of body. Influence of resonant circuit on decoupling arrangement remains low esp. outside detuning phase, and no current flows in surface coil at this time.

ABSTRACTED-PUB-NO: EP 262495B  
EQUIVALENT-ABSTRACTS:

A nuclear spin resonance apparatus for detecting spectra or images of an object under examination by means of nuclear magnetic resonance with coils (1,2,3,4,7,8) for applying magnetic base and gradient fields to the object under examination (5), with a whole-body antenna (9), with which the object under examination (5) is irradiated with a series of high frequency pulses with the wave length  $\lambda$  and with a surface coil (19), which detects nuclear resonance signals emitted by the object under examination (5), wherein the whole-body antenna (9) and the surface coil (19) are decoupled from each other, characterised in that connected to the whole body antenna (9) by way of a coaxial line (22, 23) there is A/4 line (20), the end of which is short-circuited, when emitting HF pulses, with the whole-body antenna (9), and when receiving the nuclear resonance signals, is opened with the surface coil (19), wherein the coaxial line (22, 23) transforms the high impedance of the whole-body antenna (9) to a low level.

(7pp)

US 4801885A

The nuclear magnetic resonance apparatus includes a whole-body antenna, for transmitting radio frequency signals at a wavelength to induce nuclear magnetic resonance phenomena in the examination subject and a surface coil for receiving the resulting nuclear magnetic resonance signals. For decoupling the body resonator from the surface coil, a quarter wavelength line is connected to the surface coil. A terminating end of the line is short-circuited during emission of radio frequency pulses by the body resonator and is opened during reception of nuclear magnetic resonance signals using the surface coil. ADVANTAGE - Gives complete decoupling.

(7pp)

CHOSEN-DRAWING: Dwg. 2/5

DERWENT-CLASS: S03 S05

EPI-CODES: S03-E07; S05-D02X;

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	W/O	Draw.
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☐ 6. Document ID: US 4801885 A      Relevance Rank: 93

L11: Entry 13 of 14

File: USPT

Jan 31, 1989

US-PAT-NO: 4801885

DOCUMENT-IDENTIFIER: US 4801885 A

TITLE: Nuclear magnetic resonance apparatus for the identification of spectra or images of an examination subject

DATE-ISSUED: January 31, 1989

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Meissner; Ralph	Erlangen			DE
Kess; Helmut	Deggendorf			DE

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Siemens Aktiengesellschaft	Berlin and Munich			DE		03

APPL-NO: 07/097138 [PALM]  
DATE FILED: September 16, 1987

## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	3632137	September 22, 1986

INT-CL-ISSUED: [04] G01R 33/20

US-CL-ISSUED: 324/318; 324/322  
US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/311, 324/313, 324/314  
See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4728896</u>	March 1988	Bendall et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0164164	December 1985	EP	
0170514	February 1986	EP	
3427666	February 1986	DE	
59-70950	April 1984	JP	
2153086	August 1985	GB	
2161940	January 1986	GB	

## OTHER PUBLICATIONS

"Improved Surface Coil Imaging in MR: Decoupling of the Excitation and Receiver Coils.sup.1, " Boskamp, Radiology, Nov. 1985, pp. 449-452.

ART-UNIT: 265

PRIMARY-EXAMINER: Levy; Stewart J.

ASSISTANT-EXAMINER: Arana; Louis M.

## ABSTRACT:

A nuclear magnetic resonance apparatus which is capable of identifying either

spectra or images of an examination subject uses a body resonator, such as a whole-body antenna, for transmitting radio frequency signals at a wave length  $\lambda$ . to induce nuclear magnetic resonance phenomena in the examination subject, and a surface coil for receiving the resulting nuclear magnetic resonance signals. For decoupling the body resonator from the surface coil, a  $\lambda/4$  line is connected to the surface coil. A terminating end of the  $\lambda/4$  line is short-circuited during emission of radio frequency pulses by the body resonator, and is opened during reception of nuclear magnetic resonance signals using the surface coil. An effective detuning of the body resonator is thus achieved during the reception event, and at the same time the transmission event is minimally influenced.

12 Claims, 5 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	Pub	Draw	U.
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☐ 7. Document ID: US 5038105 A      Relevance Rank: 93

L11: Entry 12 of 14

File: USPT

Aug 6, 1991

US-PAT-NO: 5038105

DOCUMENT-IDENTIFIER: US 5038105 A

TITLE: Series/parallel double-tuned NMR coils

DATE-ISSUED: August 6, 1991

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Codrington; Robert S.	Los Altos Hills	CA		
Rath; Alan R.	Fremont	CA		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Spectroscopy Imaging Systems Corporation	Fremont	CA				02

APPL-NO: 07/477687      [PALM]

DATE FILED: February 9, 1990

INT-CL-ISSUED: [05] G01R 33/20

US-CL-ISSUED: 324/318

US-CL-CURRENT: 324/318

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 307/520, 307/522, 328/137, 328/138, 455/325, 455/327, 333/126, 333/129, 333/132, 333/134  
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4792759</u>	December 1988	Keren et al.	324/322
<u>4801885</u>	January 1989	Meissner et al.	324/322
<u>4812764</u>	March 1989	Bendall	324/322
<u>4885541</u>	December 1989	Hayes	324/322
<u>4916418</u>	April 1990	Rath	324/318
<u>4928064</u>	May 1990	Keren	324/322

ART-UNIT: 265

PRIMARY-EXAMINER: Tokar; Michael J.

ATTY-AGENT-FIRM: Cole; Stanley Z. Fisher; Gerald M. Berkowitz; Edward H.

## ABSTRACT:

A double-tuned circuit is realized from  $1/2 \cdot \lambda \cdot \text{sub} 1$  transmission lines for connecting a pair of inductors in series at a first frequency and in parallel for a second frequency where said first and second frequencies are in the ratio of a power of two.

6 Claims, 6 Drawing figures

Full	Title	Creation	Front	Review	Classification	Date	Reference	Claims	Notes	Draw D
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☐ 8. Document ID: US 5107217 A      Relevance Rank: 93

L11: Entry 11 of 14

File: USPT

Apr 21, 1992

US-PAT-NO: 5107217

DOCUMENT-IDENTIFIER: US 5107217 A

TITLE: Radio frequency antenna for a nuclear magnetic resonance tomography apparatus

DATE-ISSUED: April 21, 1992

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Duerr; Wilhelm	Erlangen			DE

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Siemens Aktiengesellschaft	Munich			DE	03

APPL-NO: 07/499771      [PALM]

DATE FILED: March 27, 1990

## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	3910187	March 29, 1989

INT-CL-ISSUED: [05] G01R 33/20

US-CL-ISSUED: 324/322; 333/219

US-CL-CURRENT: 324/322; 333/219

FIELD-OF-CLASSIFICATION-SEARCH: 324/300, 324/307, 324/309, 324/314, 324/318, 324/322, 333/219

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4435680</u>	March 1984	Froncisz et al.	
<u>4446429</u>	May 1984	Froncisz et al.	
<u>4506224</u>	March 1985	Krause	
<u>4620155</u>	October 1986	Edelstein	324/318
<u>4742304</u>	May 1988	Schnall et al.	
<u>4755756</u>	July 1988	Nishihara et al.	324/322
<u>4792759</u>	December 1988	Keren et al.	324/322
<u>4801885</u>	January 1989	Meissner et al.	
<u>4881034</u>	November 1989	Kaufman et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0094734	November 1983	EP	
0257782	March 1988	EP	
0301232	February 1989	EP	

## OTHER PUBLICATIONS

"The Design and Use of Dual-Frequency Surface Coil Providing Proton Images for Improved Localization in 31P Spectroscopy of Small Lesions", Leach et al., Medical Physics, vol. 13, No. 4, Jul./Aug. 1986, pp. 510-513.

ART-UNIT: 265

PRIMARY-EXAMINER: Tokar; Michael J.

ATTY-AGENT-FIRM: Hill, Van Santen, Steadman &amp; Simpson

## ABSTRACT:

A radio frequency antenna for a nuclear magnetic resonance tomography apparatus has

interior conductors which form a transmission line resonator with at least one shortening capacitor. The transmission line resonator can resonate at a plurality of resonator frequencies, and a trap circuit is provided for decoupling the interior conductors from the other conductors. The antenna can be operated at a number of different resonate frequencies, for example, at frequency f.sub.1 =170 MHz for protons (hydrogen) and F.sub.2 =69 MHz for phosphorous.

13 Claims, 10 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	Kind	Draw D
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☐ 9. Document ID: US 5229724 A Relevance Rank: 93

L11: Entry 9 of 14

File: USPT

Jul 20, 1993

US-PAT-NO: 5229724

DOCUMENT-IDENTIFIER: US 5229724 A

TITLE: Sample head for nuclear resonance measurements

DATE-ISSUED: July 20, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zeiger; Heinz	Waldbronn			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Bruker Analytische Messtechnik GmbH				DE		03

APPL-NO: 07/642626 [PALM]

DATE FILED: January 17, 1991

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	4002160	January 25, 1990

INT-CL-ISSUED: [05] G01V 3/00

US-CL-ISSUED: 324/322; 324/318

US-CL-CURRENT: 324/322; 324/318

FIELD-OF-CLASSIFICATION-SEARCH: 324/300, 324/307, 324/309, 324/314, 324/318, 324/322, 128/653.5

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS



PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4446431</u>	May 1984	McKay	324/318
<u>4728896</u>	March 1988	Bendall et al.	324/318
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4952879</u>	August 1990	Van Vaals et al.	324/322
<u>4996482</u>	February 1991	Fujito	324/318
<u>5038105</u>	August 1991	Codrington et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
3634030	October 1986	DE	

## OTHER PUBLICATIONS

Review of Scientific Instruments, vol. 47, No. 12, Dec. 1976, pp. 1486 to 1488, "Single coil probe with transmission-line tuning for nuclear magnetic double resonance"-Author V. R. Cross, R. K. Hester, and J. S. Waugh.  
Journal of Magnetic Resonance 43 (1981), pp. 339 to 416 "A Multinuclear Double-Tuned Probe for Applications with Solids or Liquids Utilizing Lumped Tuning Elements" Authors: F. David Doty, Ruth R. Inners, and Paul D. Ellis.  
Review of Scientific Instruments, vol. 51 (7), Jul. 1980, pp. 887 to 890 "A single-coil triple resonance probe for NMR experiments" Authors: S. Kan, M. Fan, and J. Courtieu.

ART-UNIT: 263

PRIMARY-EXAMINER: Arana; Louis

ATTY-AGENT-FIRM: Rosenblum, Parish &amp; Isaacs

## ABSTRACT:

A sample head for performing nuclear magnetic resonance measurements on a first kind of nuclei (<sup>1</sup>H) and, further, on a second (<sup>15</sup>N) or a third (<sup>31</sup>P) kind of nuclei within a magnetic field (B) is disclosed. A measuring coil coacts with a sample under analysis and generates a nuclear magnetic resonance within the sample or receives a nuclear magnetic resonance signal from the sample. Terminals are provided for transmitting to or receiving from the measuring coil high-frequency signals having frequencies corresponding to the particular nuclear magnetic resonance frequency of the specific kinds of nuclei (<sup>1</sup>H, <sup>15</sup>N, <sup>31</sup>P), respectively. A high-frequency line is connected to the measuring coil at one end thereof. The line has an electric length which is an integer multiple of a quarter wavelength corresponding to the first, higher frequency. Switching means are associated to the line for switching its electrical length according to two distinct modes of operations where the second and the third, lower frequencies have different values below the first, higher frequency. By actuating the switching means, the line acts as an inductance or as a capacitance, respectively, connected in series with the measuring coil.

18 Claims, 10 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	Amend	Drawings
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☐ 10. Document ID: US 5258718 A Relevance Rank: 93

L11: Entry 8 of 14

File: USPT

Nov 2, 1993

US-PAT-NO: 5258718

DOCUMENT-IDENTIFIER: US 5258718 A

TITLE: Nuclear magnetic resonance tomography apparatus

DATE-ISSUED: November 2, 1993

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Duerr; Wilhelm	Erlangen			DE

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Siemens Aktiengesellschaft	Munich			DE	03

APPL-NO: 07/790506 [PALM]

DATE FILED: November 12, 1991

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
DE	4038648	December 4, 1990

INT-CL-ISSUED: [05] G01R 33/20

US-CL-ISSUED: 324/322

US-CL-CURRENT: 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/300, 324/307, 324/309, 324/318, 324/319, 324/322, 128/653.5

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4620155</u>	October 1986	Edelstein	324/322
<u>4763076</u>	August 1988	Arakawa et al.	324/322
<u>4764726</u>	August 1988	Misic et al.	324/322
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4890602</u>	December 1989	Haragashira	324/318

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0276508	August 1988	EP	
0315382	May 1989	EP	
0317090	May 1989	EP	
3003302	December 1982	DE	
3728863	March 1989	DE	
4003138	August 1990	DE	
9012639	December 1990	DE	

## OTHER PUBLICATIONS

Patents Abstract of Japan, P-314, Nov. 17, 1984, vol. 8/No. 252, Japanese Application No. 57-233506.  
Siemens Brochure "Surge Arresters" 1985/1986.  
"A Versatile Secondary Transmitter Unit for Nuclear Magnetic Resonance Spectroscopy." Retournard et al. Rev. Sci. Instrum., 6(1), Jan., 1990, pp. 69-76.

ART-UNIT: 267

PRIMARY-EXAMINER: Tokar; Michael J.

ATTY-AGENT-FIRM: Hill, Steadman &amp; Simpson

## ABSTRACT:

In a nuclear magnetic resonance tomography apparatus, having a high-frequency excitation and measuring coil connected with a capacitor to form a resonant circuit, the capacitor being tuned to a desired operating frequency, a circuit is provided for limiting the voltage of the resonant capacitor in a transmission mode. Avoidance of impermissible peak amplitudes is thereby achieved without the necessity of over-dimensioning the components of the resonant circuit.

15 Claims, 7 Drawing figures

Full	Title	Origin	Front	Review	Classification	Date	Reference			Claims	Draw	Draw D
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☐ 11. Document ID: US 5621323 A Relevance Rank: 93

L11: Entry 5 of 14

File: USPT

Apr 15, 1997

US-PAT-NO: 5621323

DOCUMENT-IDENTIFIER: US 5621323 A

TITLE: Surface coil elements

DATE-ISSUED: April 15, 1997

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
------	------	-------	----------	---------

Larsen; Sanford

Provo

UT

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Magnetic Research, Inc.	Mapleton	UT			02

APPL-NO: 08/489792 [PALM]

DATE FILED: June 13, 1995

## PARENT-CASE:

This application is a continuation of application Ser. No. 07/800,496, filed Nov. 29, 1991, now abandoned.

INT-CL-ISSUED: [06] G01R 33/20

US-CL-ISSUED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/300, 128/653.2, 128/653.5  
See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
4126823	November 1978	Dalton, Jr.	324/301
<u>4408162</u>	October 1983	Egger	324/318
<u>4564812</u>	January 1986	Van Dijk	324/318
<u>4620155</u>	October 1986	Edelstein	324/318
<u>4684895</u>	August 1987	Misic	324/322
<u>4717881</u>	January 1988	Flugan	324/318
<u>4728896</u>	March 1988	Bendall et al.	324/318
<u>4739271</u>	April 1988	Haase	324/322
<u>4782298</u>	November 1988	Arakawa et al.	324/318
<u>4788503</u>	November 1988	Va Heelsbergen	324/322
<u>4801885</u>	January 1989	Meissner	324/318
<u>4839594</u>	June 1989	Misic et al.	324/318
<u>4855680</u>	August 1989	Arakawa et al.	324/322
<u>4866387</u>	September 1989	Hyde	324/318
<u>4974113</u>	November 1990	Gabrielge et al.	324/320
<u>5136244</u>	August 1992	Jones et al.	324/318
<u>5144240</u>	September 1992	Mehdizadeh et al.	324/322
<u>5166618</u>	November 1992	Jones et al.	324/318
<u>5256971</u>	October 1993	Boskamp	324/318
<u>5256972</u>	October 1993	Keren et al.	324/318
<u>5278505</u>	January 1994	Arakawa	324/322

ART-UNIT: 225

PRIMARY-EXAMINER: Snow; Walter E.

ASSISTANT-EXAMINER: Mah; Raymond Y.

ATTY-AGENT-FIRM: Drucker; I. Morley Sommers; Howard N. Kimbell; Daniel R.

ABSTRACT:

A coil element, comprising a quadrature surface coil, includes side by side loops, slightly overlapped to the degree necessary to cancel mutual inductance. A coil includes a split-capacitor configuration for balanced-to-unbalanced conversion between the coil and a coaxial cable, without interfering with the highly magnetic environment of a magnetic resonance imaging system. A coil includes multiple diodes and current stabilizing impedances in parallel, or alternatively a combination of a fast low-power PIN diode and a slow high-power diode to effectively multiply the power handling capability of fast diodes for passive decoupling in a decoupling circuit for reducing the risk to the patient over active decoupling. A coil includes a counter-rotating decoupling circuit to cancel the effects of decoupler radiation, and to prevent lowering of the quality factor of the decoupling circuit and the detection of undesirable image artifacts. A coil includes a capacitor and decoupling circuit opposite that of the primary tuning and decoupling circuit for increased symmetry during the imaging cycle receive and transmit phases.

19 Claims, 6 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	MMC	Draw. D.
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☐ 12. Document ID: US 5675254 A      Relevance Rank: 93

L11: Entry 4 of 14

File: USPT

Oct 7, 1997

US-PAT-NO: 5675254

DOCUMENT-IDENTIFIER: US 5675254 A

TITLE: Double-resonance MRI coil

DATE-ISSUED: October 7, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Fiat; Daniel	Oak Park	IL		
Dolinsek; Janez	Ljubljana			SI

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
The Board of Trustees of the University of Illinois	Urbana	IL				02

APPL-NO: 08/623667      [PALM]

DATE FILED: March 28, 1996

## PARENT-CASE:

This is a Continuation of U.S. application Ser. No. 08/501,888, filed Jul. 13, 1995, now abandoned which is a Continuation of U.S. application Ser. No. 08/105,419, filed Aug. 12, 1993, now abandoned and which is a continuation-in-part of U.S. Ser. No. 08/071,582, entitled "Oxygen-17 NMR Spectroscopy and Imaging in the Human," filed Jun. 2, 1993, now U.S. Pat. No. 5,433,196.

INT-CL-ISSUED: [06] G01R 33/34

US-CL-ISSUED: 324/318

US-CL-CURRENT: 324/318

FIELD-OF-CLASSIFICATION-SEARCH: 324/300, 324/318, 324/322, 335/279  
See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4446431</u>	May 1984	McKay	324/318
<u>4677382</u>	June 1987	Vatis	324/307
<u>4689563</u>	August 1987	Bottomley et al.	324/309
<u>4691163</u>	September 1987	Blass et al.	324/318
<u>4742304</u>	May 1988	Schnall et al.	324/318
<u>4792759</u>	December 1988	Keren et al.	324/318
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4890063</u>	December 1989	Haragashira	324/322
<u>4916418</u>	April 1990	Rath	324/318
<u>4928064</u>	May 1990	Keren	324/318
<u>4952879</u>	August 1990	Van Vaals et al.	324/318
<u>5038105</u>	August 1991	Codrington	324/318
<u>5057778</u>	October 1991	Rath	324/318
<u>5162739</u>	November 1992	Doty	324/322
<u>5210494</u>	May 1993	Brunner et al.	324/318
<u>5229724</u>	July 1993	Zeiger	324/318
<u>5245285</u>	September 1993	Ishizuka et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
3634030	April 1988	DE	

## OTHER PUBLICATIONS

Cross et al., Single coil probe with transmission-line tuning for nuclear double resonance, 47(12) 1486 (Dec., 1976).

Doty et al., A Multinuclear Double Tuned Probe for Applications with Solids or Liquids Utilizing Lumped Tuning Elements, 43 Journal of Magnetic Resonance 399 (1988).

Fiat et al., Determination of the Rate of Cerebral Oxygen Consumption and regional Blood Flow by <sup>17</sup>O In Vivo NMR Spectroscopy and Magnetic Resonance Imaging, 14 Neurological Research 303 (Sep., 1992).

Fiat et al., Determination of the Rate of Cerebral Oxygen Consumption and Regional Cerebral Blood Flow by Non-Invasive <sup>17</sup>O In Vivo NMR Spectroscopy and Magnetic Resonance Imaging, 15 Neurological Research 7 (Feb. 1993).

Fiat et al., Monitoring Cerebral Oxygen Consumption with In Vivo Imaging <sup>17</sup>O NMR, Presented at the XVth International Symposium on Cerebral Flow and Metabolism, Jun. 1-6, 1996, Miami, Florida.

Fiat et al., In Vivo <sup>17</sup>O NMR Study of Rat Brain during O<sub>2</sub> Inhalation, 24 Magnetic Resonance in Medicine 370 (Apr., 1992).

Fiat et al., <sup>17</sup>O NMR and MRI Determination of Cerebral Metabolism of Oxygen (rCMRO<sub>2</sub>) and Cerebral Blood Flow (rCBF) <sup>1</sup> in the Man, (1993).

Kan et al., A single coil triple resonance probe for NMR experiments, 51(7) Rev. Sci. Instr. 887 (Jul., 1980).

McFarland et al., Chemical Exchange Magnetic Resonance Imaging (Chemical), 6 Magnetic Resonance Imaging 507 (1988).

Mateescu et al., Water, Ions and <sup>17</sup>O Magnetic Resonance Imaging, Water and Ions in Biological Systems 239 (1988).

Mateescu et al., Oxygen-17 FIRS: In Vivo Evaluation of Water Uptake and Residence Time in the Mouse Brain after Injection of <sup>17</sup>O Labelled Water, p. 1236 (1990).

Mateescu et al., Oxygen-17 MRI and MRS of the Brain, the Heart and Coronary Arteries, (1989).

Mateescu et al., Oxygen-17: A physiological, biochemical, and Anatomical MRI Contrast Agent, Society of Magnetic Resonance in Medicine 600 (1988).

Mateescu et al., Oxygen-17 Magnetic Resonance: In Vivo Detection of Nascent Mitochondrial Water in Animals Breathing <sup>17</sup>O<sub>2</sub> Enriched Air, Society of Magnetic Resonance in Medicine (1991).

Mateescu et al., Combined <sup>17</sup>O/<sup>1</sup>H Magnetic Resonance Microscopy in Plants, Animals and Materials: Present Status and Potential, Synthesis and Applications of Isotopically Labelled Compounds 499 (1988).

Pekar et al., In Vivo Measurement of Cerebral Oxygen Consumption and Blood Flow Using <sup>17</sup>O Magnetic Resonance Imaging, 21 Magnetic Resonance in Medicine 313 (1991).

Schnall et al., A New Double-Tuned Probe for Concurrent <sup>1</sup>H and <sup>31</sup>P NMR, 65 Journal of Magnetic Resonance 122 (1985).

Doty et al., "A Multinuclear Double Tuned Probe for Applications with Solids of Liquids Utilizing Lump Tuning Elements," J. of Mag. Res 43,399-416 (1981).

Kan et al., "A Single Coil Triple Resonance Probe for NMR Experiments" Rev Sci Instrum. 51(7) pp. 887-890 (Jul. 1980).

Cross et al., "Single Coil Probe with Transmission-line Tuning for Nuclear Double Resonance." vol. 47 No. 12 pp. 1486-1488 (Dec. 1976).

Fiat, et al., "Determination of the Rate of Cerebral Oxygen Consumption and Regional Cerebral Blood Flow by Non-Invasive <sup>17</sup>O In Vivo NMR Spectroscopy and Magnetic Resonance Imaging," Neurological Research, vol. 14, pp 303-311 (Sep. 1992).

Fiat, et al., "Determination of the Rate of Cerebral Oxygen Consumption and Regional Cerebral Blood Flow by Non-Invasive <sup>17</sup>O In Vivo NMR Spectroscopy and Magnetic Resonance Imaging," Neurological Research, vol. 15, pp. 7-22 (Feb. 1993).

Fiat, et al., "Monitoring Cerebral Oxygen Consumption with In Vivo Imaging <sup>17</sup>O NMR," Presented at the XVth International Symposium on Cerebral Flow and Metabolism, Jun. 1-6, 1991, Miami, Florida.

Fiat, et al. "In Vivo <sup>17</sup>O NMR Study of Rat Brain during <sup>17</sup>O<sub>2</sub> Inhalation," Magnetic Resonance in Medicine 24, pp 370-374, (Apr. 1992).

Fiat, et al., "<sup>17</sup>O NMR and MRI Determination of Cerebral Metabolism of Oxygen (rCMRO<sub>2</sub>) and Cerebral Blood Flow (rCBF) <sup>1</sup> in the Man" (1993).

McFarland, et al., "Chemical Exchange Magnetic Resonance Imaging (Chemical)," Magnetic Resonance Imaging, vol. 6, pp 507-515 (1988).

Mateescu, et al., "Water, Ions and <sup>17</sup>O Magnetic Resonance Imaging," Water and Ions in Biological Systems, pp 239-250 (1988).

Mateescu, et al., "Oxygen-17 MRS: In Vivo Evaluation of Water Uptake and Residence Time in the Mouse Brain after Injection of O-17 Labelled Water," p. 1236 (1990).  
Mateescu, et al., "Oxygen-17 MRI and MRS of the Brain, the Heart and Coronary Arteries," (1989).  
Mateescu, et al., "Oxygen-17: A Physiological, Biochemical and Anatomical MRI Contrast Agent," Society of Magnetic Resonance in Medicine, p. 600 (1988).  
Mateescu, et al., "Oxygen-17 Magnetic Resonance: In Vivo Detection of Nascent Mitochondrial Water in Animals Breathing .sup.17 O.sub.2 Enriched Air," Society of Magnetic Resonance in Medicine (1991).  
Mateescu, et al., "Combined .sup.17 O/.sup.1 H Magnetic Resonance Microscopy in Plants, Animals and Materials: Present Status and Potential," Synthesis and Applications of Isotopically Labelled Compounds, pp 499-508 (1988).  
Pekar, et al., "In Vivo Measurement of Cerebral Oxygen Consumption and Blood Flow Using .sup.17 O Magnetic Resonance Imaging," Magnetic Resonance in Medicine 21, pp. 313-319 (1991).  
Schnall, et al., "A New Double-Tuned Probe for Concurrent .sup.1 H and .sup.31 P NMR," Journal of Magnetic Resonance 65, pp 122-129 (1985).

ART-UNIT: 225

PRIMARY-EXAMINER: O'Shea; Sandra L.

ASSISTANT-EXAMINER: Phillips; Roger

ATTY-AGENT-FIRM: Welsh & Katz, Ltd.

ABSTRACT:

A double-resonance coil for use in MRI having a coil element, a first input/output terminal coupled to the coil element, and a second input/output terminal coupled to the coil element. A first resonance means is coupled between the coil element and the first input/output terminal to cause the MRI coil to resonate at a first MRI frequency, and a second resonance means is coupled between the coil element and the second input/output terminal to cause the MRI coil to resonate at a second MRI frequency substantially different than the first MRI frequency. The double resonance coil includes a first frequency-blocking means coupled to the coil element for substantially preventing the second MRI frequency from being detected at the first input/output terminal and a second frequency-blocking means coupled to the coil element for substantially preventing the first MRI frequency from being detected at the second input/output terminal.

20 Claims, 2 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	MMC	Discl. U.
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☐ 13. Document ID: US 6483244 B1 Relevance Rank: 93

L11: Entry 2 of 14

File: USPT

Nov 19, 2002

US-PAT-NO: 6483244

DOCUMENT-IDENTIFIER: US 6483244 B1

TITLE: Method of fast start and/or fast termination of a radio frequency resonator



DATE-ISSUED: November 19, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kawato; Eizo	Kizucho			JP
Ding; Li	Manchester			GB

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Shimadzu Research Laboratory (Europe) Ltd.	Manchester			GB		03

APPL-NO: 09/868751 [PALM]

DATE FILED: July 31, 2001

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE
PCT/GB98/03856	December 21, 1998	WO00/38312	Jun 29, 2000	

INT-CL-ISSUED: [07] H03B 5/12

US-CL-ISSUED: 315/39.51; 331/167

US-CL-CURRENT: 315/39.51; 331/167

FIELD-OF-CLASSIFICATION-SEARCH: 315/39.51, 324/318, 324/322, 331/165, 331/166, 331/167, 331/117FE, 331/173

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2939952</u>	June 1960	Paul et al.	
<u>3866145</u>	February 1975	Hess, Jr. et al.	
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4833427</u>	May 1989	Leuthold et al.	
<u>5399857</u>	March 1995	Doroshenko et al.	
<u>5517158</u>	May 1996	Gabara	

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
WO 99/39368	August 1999	WO	
WO 99/39370	August 1999	WO	

ART-UNIT: 2821

PRIMARY-EXAMINER: Wong; Don

ASSISTANT-EXAMINER: Clinger; James

ATTY-AGENT-FIRM: Leydig, Voit & Mayer, Ltd.

ABSTRACT:

A method of fast start and/or fast termination of a radio frequency resonator, which has a coil, a capacitor and two switches with internal resistance wherein one end of the switches is connected to a junction of the coil and the capacitor where a RF voltage is provided, and another end of each switch is connected to high voltage power supplies with opposite polarities, a fast start being achieved by closing one of the switches for a short period of time for fast start, and a fast termination being obtained by closing both switches for a while.

19 Claims, 2 Drawing figures

Full	Title	Class	Front	Review	Classification	Date	Reference			Claims	Draw	Draw
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☐ 14. Document ID: US 6762561 B1 Relevance Rank: 93

L11: Entry 1 of 14

File: USPT

Jul 13, 2004

US-PAT-NO: 6762561

DOCUMENT-IDENTIFIER: US 6762561 B1

TITLE: Radio frequency resonator

DATE-ISSUED: July 13, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kawato; Eizo	Kizucho			JP

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Shimadzu Research Laboratory (Europe) Ltd.	Manchester			GB		03

APPL-NO: 10/221893 [PALM]

DATE FILED: September 17, 2002

PCT-DATA:

APPL-NO	DATE-FILED	PUB-NO	PUB-DATE	371-DATE
PCT/GB00/01239	March 31, 2000	WO01/75935	Oct 11, 2001	

INT-CL-ISSUED: [07] H03B 11/00, H03B 11/08, H03B 11/10

US-CL-ISSUED: 315/39.51; 331/167, 331/165, 331/166, 331/173, 331/128, 315/226, 315/276, 250/292

US-CL-CURRENT: 315/39.51; 250/292, 315/226, 315/276, 331/128, 331/165, 331/166, 331/167, 331/173

FIELD-OF-CLASSIFICATION-SEARCH: 331/165, 331/166, 331/167, 331/173, 331/128, 250/281, 250/282, 250/287, 250/288, 250/292, 315/39.51, 315/209PZ, 315/226, 315/276, 324/318, 324/322, 333/99MP, 363/87, 388/819

See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>2939952</u>	June 1960	Paul et al.	250/292
<u>3866145</u>	February 1975	Hess et al.	331/128
<u>4547706</u>	October 1985	Krummel	315/226
<u>4550297</u>	October 1985	Harrison	333/99MP
<u>4767999</u>	August 1988	VerPlanck	331/166
<u>4801855</u>	January 1989	Nohmi et al.	388/819
<u>4801885</u>	January 1989	Meissner et al.	324/318
<u>4815052</u>	March 1989	Walker	363/87
<u>5243289</u>	September 1993	Blum et al.	324/322
<u>5466992</u>	November 1995	Nemirow et al.	315/276
<u>5663648</u>	September 1997	Chapman et al.	324/322
<u>6124678</u>	September 2000	Bishop et al.	315/209PZ
<u>6483244</u>	November 2002	Kawato et al.	315/39.51

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0 926 926	June 1999	EP	
2 326 804	April 1977	FR	
2326804	June 1977	FR	
WO 99/39370	August 1999	WO	
WO 00/38312	June 2000	WO	

OTHER PUBLICATIONS

Blauth, "Dynamic mass spectrometers," XP-00215375, p. 110-155 (1966).  
Walcher, XP002153716, p. 304-309 (1989).

ART-UNIT: 2881

PRIMARY-EXAMINER: Lee; John R.

ASSISTANT-EXAMINER: El-Shammaa; Mary

ATTY-AGENT-FIRM: Leydig, Voit & Mayer, Ltd.

## ABSTRACT:

An apparatus having a radio frequency resonator, which has a coil, a capacitor means and at least one switch means being associated with another capacitor means, a resistor means and a high voltage supply means, one end of the switch means being connected to a junction of the coil and the capacitor means where a radio frequency voltage is provided, another end of the switch means being connected to ground with said another capacitor means and to the high voltage power supply means with the resistor means.

17 Claims, 4 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	IPC	Draw
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Clear	Generate Collection	Print	Fwd Refs	Bkwd Refs	Generate OACS
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Term	Documents
"4801885"	14
4801885S	0
"4801885".PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	14
(4801885 ).PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD.	14

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Company, LLC

Waukesha WI

02

APPL-NO: 10/260603 [PALM]  
DATE FILED: September 30, 2002

INT-CL-ISSUED: [07] G01 V 3/00

US-CL-ISSUED: 324/318; 324/322  
US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/320, 324/322, 324/300, 324/306,  
324/307, 324/309, 324/314, 600/421, 600/422  
See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>5143688</u>	September 1992	Mansfield	324/318
<u>6223065</u>	April 2001	Misic et al.	600/410
<u>6411090</u>	June 2002	Boskamp	324/318

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Roemer, Edelstein, Hayes, Souza & Mueller, "The NMR Phased Array," Magnetic Resonance in Medicine 16, 1990, p 192.

ART-UNIT: 2862

PRIMARY-EXAMINER: Arana; Louis

ATTY-AGENT-FIRM: Heino; Joseph S. Horton; Carl B.

## ABSTRACT:

The present invention provides for a body coil modeled after a birdcage coil and based on a ladder network design. A fixed number of single loop coils (N) are equally spaced around a cylinder. These coils must be driven 360.degree./N out of phase with respect to each other azimuthally. Each phase must increase 360.degree./N as azimuthally in order for single loop coil currents to mimic currents commonly seen in the quadrature birdcage coil. A switching circuit is necessary to change the transmit coil configuration and the N channel for phased array reception. This type of coil eliminates the otherwise necessary need to decouple the transmit coil from the receiver coils, but preserves the SNR benefit of having multiple receiver coils. This type of coil will improve SNR over ordinary volume coils and may be necessary imaging large patients where space around the patient is at a minimum.

26 Claims, 6 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	AMC	Drawings
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☐ 3. Document ID: US 6408202 B1 Relevance Rank: 48

L23: Entry 21 of 30

File: USPT

Jun 18, 2002

US-PAT-NO: 6408202

DOCUMENT-IDENTIFIER: US 6408202 B1

**\*\* See image for Certificate of Correction \*\***

TITLE: Transesophageal magnetic resonance analysis method and apparatus

DATE-ISSUED: June 18, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lima; Joao A. C.	Timonium	MD		
Shunk; Kendrick A.	Baltimore	MD		
Atalar; Ergin	Columbia	MD		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
The Johns Hopkins University	Baltimore	MD			02

APPL-NO: 09/432960 [PALM]

DATE FILED: November 3, 1999

PARENT-CASE:

CROSS REFERENCE TO RELATED APPLICATION This application claims the benefit of U.S. Provisional Application Serial No. 60/106,772, filed Nov. 3, 1998.

INT-CL-ISSUED: [07] A61 B 5/05

US-CL-ISSUED: 600/423; 600/410, 600/421, 600/380, 324/307, 324/322

US-CL-CURRENT: 600/423; 324/307, 324/322, 600/380, 600/410, 600/421

FIELD-OF-CLASSIFICATION-SEARCH: 600/373, 600/380, 600/160, 600/417, 600/421, 600/422, 600/423, 600/424, 324/307, 324/318, 324/322, 607/154, 607/156

See application file for complete search history.

PRIOR-ART-DISCLOSED:

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PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4572198</u>	February 1986	Codrington	
<u>5050607</u>	September 1991	Bradley et al.	
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<u>5170789</u>	December 1992	Narayan et al.	

<u>5211166</u>	May 1993	Sepponen
<u>5348010</u>	September 1994	Schnall et al.
<u>5355087</u>	October 1994	Claiborne et al.
<u>5417713</u>	May 1995	Cohen
<u>5419325</u>	May 1995	Dumoulin et al.
<u>5432450</u>	July 1995	Rubinson
<u>5546951</u>	August 1996	Ben-Haim
<u>5699801</u>	December 1997	Atalar et al.
<u>5792055</u>	August 1998	McKinnon
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ART-UNIT: 3737

PRIMARY-EXAMINER: Lateef; Marvin M.

ASSISTANT-EXAMINER: Qaderi; Runa Shah

ATTY-AGENT-FIRM: Houser; Kirk D. Eckert Seamans Cherin & Mellott, LLC

#### ABSTRACT:

A method of transesophageal magnetic resonance analysis of a patient, such as an animal or human, includes providing a loopless antenna formed from a flexible coaxial cable having an extended center conductor at the distal end thereof. A distal portion of the loopless antenna is secured within a Levin-type gastric tube. The gastric tube which receives the loopless antenna is inserted in the esophagus of the patient. A tuning, matching and decoupling circuit for the loopless antenna is employed external to the patient. The tuning, matching and decoupling circuit is electrically connected to a magnetic resonance imaging scanner. The magnetic resonance imaging scanner is employed to display an image of the aorta of the patient.

51 Claims, 20 Drawing figures



Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	RMK	Draw
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☐ 4. Document ID: US 6549800 B1      Relevance Rank: 45

L23: Entry 19 of 30

File: USPT

Apr 15, 2003

US-PAT-NO: 6549800

DOCUMENT-IDENTIFIER: US 6549800 B1

TITLE: Methods for in vivo magnetic resonance imaging

DATE-ISSUED: April 15, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Atalar; Ergin	Columbia	MD		
Bottomley; Paul A.	Columbia	MD		
Zerhouin; Elias	Pasadena	MD		
Halperin; Henry	Baltimore	MD		
McVeigh; Elliot	Potomac	MD		
Lardo; Albert C.	Lutherville	MD		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE	CODE
Johns Hopkins University School of Medicine	Baltimore	MD				02

APPL-NO: 09/549921      [PALM]

DATE FILED: April 14, 2000

PARENT-CASE:

REFERENCE TO PRIOR APPLICATIONS This application claims the benefit of U.S. Provisional Patent Application No. 60/129,368 filed Apr. 15, 1999, U.S. Provisional Patent Application No. 60/129,364, filed Apr. 15, 1999, U.S. Provisional Patent Application No. 60/192,133 filed Mar. 24, 2000, and is a continuation-in-part of U.S. patent application Ser. No. 09/536,090 to Albert C. Lardo et al., filed Mar. 24, 2000, and is also a continuation-in-part of U.S. patent application Ser. No. 09/360,144 to Ocali et al., filed Jul. 26, 1999, which is a continuation-in-part of U.S. patent application Ser. No. 08/638,934 to Ocali et al., filed Apr. 25, 1996, now U.S. Pat. No. 5,928,145, issued Jul. 27, 1999. The disclosures of these applications are incorporated herein by reference.

INT-CL-ISSUED: [07] A61 B 5/05

US-CL-ISSUED: 600/423; 600/407, 600/410, 600/415, 600/417, 600/424, 606/130, 324/301, 324/244, 324/256, 324/257, 324/260

US-CL-CURRENT: 600/423; 324/244, 324/256, 324/257, 324/260, 324/301, 600/407, 600/410, 600/415, 600/417, 600/424, 606/130

FIELD-OF-CLASSIFICATION-SEARCH: 600/423, 600/407, 600/409, 600/410, 600/415,

600/417, 600/424, 324/300, 324/301, 324/302, 324/244, 324/256, 324/257, 324/260,  
324/200, 606/130

See application file for complete search history.

PRIOR-ART-DISCLOSED:

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<u>4431005</u>	February 1984	McCormick	128/656
<u>4445501</u>	May 1984	Bresler	128/1.5
<u>4572198</u>	February 1986	Codrinton	128/653
<u>4643186</u>	February 1987	Rosen et al.	128/303.1
<u>4672972</u>	June 1987	Berke	128/653
<u>4766381</u>	August 1988	Conturo et al.	324/309
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<u>4858613</u>	August 1989	Fry et al.	128/660.03
<u>4897604</u>	January 1990	Carlson et al.	324/318
<u>4922204</u>	May 1990	Duerr et al.	324/322
<u>4932411</u>	June 1990	Fritschy et al.	128/653
<u>4960106</u>	October 1990	Kubokawa	128/6
<u>5019075</u>	May 1991	Spears et al.	606/7
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<u>5095911</u>	March 1992	Pomeranz	128/662.06
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0 768 539	April 1997	EP	
0 850 595	July 1998	EP	
0 908 739	April 1999	EP	
6-70902	March 1994	JP	
WO 98/52064	November 1998	WO	
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ART-UNIT: 3737

PRIMARY-EXAMINER: Lateef; Marvin M.

ASSISTANT-EXAMINER: Lin; Jeoyuh

ATTY-AGENT-FIRM: Foley Hoag LLP

ABSTRACT:

The systems and methods of the present invention provide for MRI probes adapted for insertion into a plurality of body orifices, in order to evaluate the anatomy of proximate anatomic structures, to diagnose abnormalities thereof and to treat the diagnosed abnormalities. MRI probes are described that are suitable for use in the mediastinum, in the pancreatobiliary system, in the tracheobronchopulmonary system, in the head and neck, in the genitourinary system, the gastrointestinal system, the vascular system, and in the evaluation, diagnosis and treatment of internal fluid collections.

148 Claims, 11 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference		Claims	KWIC	Drawings
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☐ 5. Document ID: US 20030028094 A1      Relevance Rank: 45

L23: Entry 10 of 30

File: PGPB

Feb 6, 2003

PGPUB-DOCUMENT-NUMBER: 20030028094

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030028094 A1

TITLE: Biopsy and sampling needle antennas for magnetic resonance imaging-guided biopsies

PUBLICATION-DATE: February 6, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Kumar, Ananda	Baltimore	MD	US
Atalar, Ergin	Columbia	MD	US
Ocali, Ogan	Sunnyvale	CA	US

APPL-NO: 10/131601 [PALM]

DATE FILED: April 24, 2002

## RELATED-US-APPL-DATA:

Application 10/131601 is a continuation-in-part-of US application 09/360144, filed July 26, 1999, PENDING

Application 09/360144 is a continuation-in-part-of US application 08/638934, filed April 25, 1996, US Patent No. 5928145

Application is a non-provisional-of-provisional application 60/286271, filed April 25, 2001,

INT-CL-PUBLISHED: [07] A61 B 5/05

US-CL-PUBLISHED: 600/410; 600/411, 600/423

US-CL-CURRENT: 600/410; 600/411, 600/423

REPRESENTATIVE-FIGURES: 18 19

## ABSTRACT:

Herein is disclosed a magnetic resonance imaging antenna, including an inner conductor, an outer shield slideably displaceable with respect to the inner conductor, and an insulator electrically insulating the inner conductor from the outer shield. Herein is disclosed a biopsy needle antenna, including a magnetic resonance imaging antenna, having an outer shield, and an inner conductor electrically insulated from the outer shield by a dielectric; and a biopsy needle electrically connected to the inner conductor and electrically insulated from the outer shield by the dielectric. Herein is disclosed a method of obtaining a sample with magnetic resonance imaging guidance, including providing a sampling needle magnetic resonance imaging antenna, advancing the antenna to a structure from which the sample is to be taken, detecting magnetic resonance data by the antenna, and coupling the sample to the antenna.

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent application Ser. No. 09/360,144, filed Jul. 26, 1999, which is a continuation-in-part of U.S. patent application Ser. No. 08/638,934, filed Apr. 25, 1996, now U.S. Pat. No. 5,928,145. This application also claims benefit of priority to U.S. Provisional patent application Serial No. 60/286,271, filed Apr. 24, 2001, entitled "Biopsy Needle Antenna for MR Guided Biopsies." The aforementioned applications are incorporated herein in their entireties by this reference.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	FIG.	Draw. D.
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☐ 6. Document ID: US 6177797 B1      Relevance Rank: 42

L23: Entry 22 of 30

File: USPT

Jan 23, 2001

US-PAT-NO: 6177797

DOCUMENT-IDENTIFIER: US 6177797 B1

TITLE: Radio-frequency coil and method for resonance/imaging analysis

DATE-ISSUED: January 23, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Srinivasan; Ravi	Richmond Heights	OH		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Advanced Imaging Research, Inc.	Cleveland	OH			02

APPL-NO: 08/993932 [PALM]

DATE FILED: December 18, 1997

## PARENT-CASE:

CROSS-REFERENCE TO RELATED APPLICATION This application claims the benefit of U.S. Provisional Patent Application No. 60/033,611, filed Dec. 19, 1996.

INT-CL-ISSUED: [07] G01 V 3/00

US-CL-ISSUED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/312, 324/314, 324/307, 324/309, 324/300

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4411270</u>	October 1983	Damadian	
<u>4793356</u>	December 1988	Misic et al.	
<u>4799016</u>	January 1989	Rezvani	
<u>4820985</u>	April 1989	Eash	
<u>4825162</u>	April 1989	Roemer et al.	
<u>4833409</u>	May 1989	Eash	
<u>4943775</u>	July 1990	Boskamp et al.	
<u>5057778</u>	October 1991	Rath	
<u>5144240</u>	September 1992	Mehdizadeh et al.	
<u>5208534</u>	May 1993	Okamoto et al.	
<u>5258717</u>	November 1993	Misic et al.	
<u>5270656</u>	December 1993	Roberts et al.	

<u>5382903</u>	January 1995	Young	
<u>5521506</u>	May 1996	Misic et al.	
<u>5543711</u>	August 1996	Srinivasan et al.	324/318
<u>5548218</u>	August 1996	Lu	
<u>5592088</u>	January 1997	Matsunaga et al.	
<u>5602479</u>	February 1997	Srinivasan et al.	324/318
<u>5646531</u>	July 1997	Renz	324/318
<u>5680047</u>	October 1997	Srinivasan et al.	

## OTHER PUBLICATIONS

International Search Report related to PCT Patent Application No. PCT/US98/03529 dated Jul. 16, 1998.

"A Comprehensive Analysis for Estimating Modes in Coupled Resonators" by Ravi Srinivasan and Haiying Liu, pp 1425.

"Examples of the Design of Screened and Shielded RF Receiver Coils", by Michael Burl and Ian R. Young, pp 326-330.

ART-UNIT: 282

PRIMARY-EXAMINER: Arana; Louis

ATTY-AGENT-FIRM: Renner, Otto, Boisselle & Sklar

## ABSTRACT:

An RF coil with high signal-to-noise (S/N) and B.sub.1 homogeneity over the volume originating from the arctic arch and extending to the top of the head, which is highly desirable for quantitative (anatomical, vascular and functional) studies in-vivo. The coil is suitable for use in performing multiple studies and reducing scan time without patient repositioning. Moreover, the coil is capable of imaging in different operating modes. A split-top design is used to ease patient access.

34 Claims, 16 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	FIGS	Draw D.
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☐ 7. Document ID: US 20050275403 A1      Relevance Rank: 42

L23: Entry 3 of 30

File: PGPB

Dec 15, 2005

PGPUB-DOCUMENT-NUMBER: 20050275403

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20050275403 A1

TITLE: Transceive surface coil array for magnetic resonance imaging and spectroscopy

PUBLICATION-DATE: December 15, 2005



## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Pinkerton, Robert G.	Harrowsmith		CA
Menon, Ravi S.	London		CA

APPL-NO: 11/085800 [PALM]  
DATE FILED: March 21, 2005

## RELATED-US-APPL-DATA:

Application is a non-provisional-of-provisional application 60/554350, filed March 19, 2004,

INT-CL-PUBLISHED: [07] G01 V 3/00

US-CL-PUBLISHED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

REPRESENTATIVE-FIGURES: 1

## ABSTRACT:

A surface coil array comprises a surface coil support and an arrangement of non-overlapping magnetically decoupled surface coils mounted on the support. The surface coils encompass a volume into which a target to be imaged is placed. Magnetic decoupling circuits act between adjacent surface coils. Impedance matching circuitry couples the surface coils to conventional transmit and receive components.

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/554,350 filed on Mar. 19, 2004 for an invention entitled "Transceive Surface Coil Array For Magnetic Resonance Imaging and Spectroscopy".

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	FIG	Draw D
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☐ 8. Document ID: US 5450011 A Relevance Rank: 41

L23: Entry 25 of 30

File: USPT

Sep 12, 1995

US-PAT-NO: 5450011

DOCUMENT-IDENTIFIER: US 5450011 A

TITLE: Magnetic resonance apparatus having a wideband matching network

DATE-ISSUED: September 12, 1995

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Boeijen; Gerardus W.	Eindhoven			NL
Wardenier; Peter H.	Eindhoven			NL

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
U.S. Philips Corporation	New York	NY			02

APPL-NO: 08/041803 [PALM]  
DATE FILED: April 1, 1993

## FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	APPL-DATE
EP	92201295	May 7, 1992

INT-CL-ISSUED: [06] G01 R 33/36

US-CL-ISSUED: 324/322; 324/318  
US-CL-CURRENT: 324/322; 324/318

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/300, 324/307, 324/309, 128/653.5

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<u>4095168</u>	June 1978	Hlavka	324/310
<u>4691164</u>	September 1987	Haragashira	324/322
<u>4694255</u>	September 1987	Hayes	324/318
<u>4700137</u>	October 1987	Yoda	324/322
<u>4739271</u>	April 1988	Haase	324/322
<u>4755756</u>	July 1988	Nishihara et al.	324/300
<u>4827219</u>	May 1989	Harrison	324/322
<u>4882541</u>	November 1989	Haragashira	324/322
<u>4885541</u>	December 1989	Hayes	324/322
<u>4920315</u>	April 1990	Hokbrook et al.	324/313
<u>5055792</u>	October 1991	Keren	324/318
<u>5172061</u>	December 1992	Crooks et al.	324/318

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0083728	July 1983	EP	

## OTHER PUBLICATIONS

Journal of Physics E. Scientific Instruments, vol. 14, No. 6, 1 Jun. 1981, Bristol GB pp. 700-701.

Magnetic Resonance in Medicine, vol. 3, No. 2, 1 Apr. 1986, Duluth, Minn., pp. 346-351.

"Electronics", Jan. 1944, pp. 130-133 and 318-325.

ART-UNIT: 268

PRIMARY-EXAMINER: O'Shea; Sandra L.

ASSISTANT-EXAMINER: Mah; Raymond Y.

ATTY-AGENT-FIRM: Franzblau; Bernard

## ABSTRACT:

A magnetic resonance apparatus includes an RF coil tuned to a predetermined frequency and which is connected, via a connection circuit, to a transmission and/or receiving device for RF signals. A connection circuit is provided in order to increase the bandwidth of the RF coil without imposing restrictions on the design and the construction of the coil. Therefore, viewed from the RF, the connection circuit successively includes the following elements:

a first matching network which is operative to transform an impedance connected to its output to a substantially lower value;

a circuit which has the properties of a transmission line whose effective length is substantially equal to an integer number of times one half wavelength at the frequency to which the RF coil is tuned and whose characteristic impedance is substantially equal to the input impedance of the first matching network; and

a second matching network which is operative to transform an impedance connected to its output to a substantially higher value.

18 Claims, 9 Drawing figures

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw D
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☐ 9. Document ID: US 20060033501 A1      Relevance Rank: 40

L23: Entry 1 of 30

File: PGPB

Feb 16, 2006

PGPUB-DOCUMENT-NUMBER: 20060033501

PGPUB-FILING-TYPE:

DOCUMENT-IDENTIFIER: US 20060033501 A1

TITLE: RF coil for imaging system

PUBLICATION-DATE: February 16, 2006

## INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Vaughan; J. Thomas JR.	Stillwater	MN	US

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	COUNTRY	TYPE	CODE
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The General Hospital Corporation d/b/a Massachusetts  
General Hospital

02

APPL-NO: 11/196131 [PALM]  
DATE FILED: August 3, 2005

## RELATED-US-APPL-DATA:

parent US continuation 10750031 20031229 ABANDONED  
child US 11196131 A1 20050803  
parent US continuation 10367489 20030214 PENDING  
child US 10750031 20031229  
parent US division 09575384 20000522 GRANTED  
parent-grant-document US 6633161  
child US 10367489 20030214  
us-provisional-application US 60135269 19990521

## INT-CL-PUBLISHED:

TYPE	IPC	DATE	IPC-OLD
IPCP	G01V3/00	20060101	G01V003/00

## INT-CL-CURRENT:

TYPE	IPC	DATE
CIPP	G01 V 3/00	20060101

US-CL-PUBLISHED: 324/322; 324/318

US-CL-CURRENT: 324/322; 324/318

## ABSTRACT:

An RF coil suitable for use in imaging systems is provided which coil has a dielectric filled cavity formed by a surrounding conducting enclosure, the conducting enclosure preferably being patterned to form continuous electrical paths around the cavity, each of which paths may be tuned to a selected resonant frequency. The patterning breaks up any currents inducted in the coil and shortens path lengths to permit higher frequency, and thus higher field strength operation. The invention also includes improved mechanisms for tuning the resonant frequency of the paths, for selectively detuning the paths, for applying signal to the coil, for shortening the length of the coil and for controlling the field profile of the coil and the delivery of field to the object to the image.

## RELATED APPLICATIONS

[0001] This application is a continuation of U.S. patent application Ser. No. 10/750,031, filed Dec. 29, 2003, entitled "RF Coil for Imaging System," by J. T. Vaughan, which is a continuation of U.S. patent application Ser. No. 10/367,489, filed Feb. 14, 2003, entitled "RF Coil for Imaging System," by J. T. Vaughan, which application is a divisional of U.S. patent application Ser. No. 09/575,384, filed May 22, 2000, now issued U.S. Pat. No. 6,633,161, (Oct. 14, 2003), entitled "RF Coil for Imaging System," by J. T. Vaughan, which application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/135,269, filed May 21, 1999, entitled "RF Coil for Imaging System," by J. T. Vaughan, each of which is incorporated herein by reference.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw.D
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☐ 10. Document ID: US 20040140808 A1 Relevance Rank: 40

L23: Entry 7 of 30

File: PGPB

Jul 22, 2004

PGPUB-DOCUMENT-NUMBER: 20040140808

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20040140808 A1

TITLE: RF coil for imaging system

PUBLICATION-DATE: July 22, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Vaughan, J. Thomas JR.	Stillwater	MN	US

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	COUNTRY	TYPE	CODE
The General Hospital Corporation d/b/a Massachusetts General Hospital					02

APPL-NO: 10/750031 [PALM]

DATE FILED: December 29, 2003

RELATED-US-APPL-DATA:

child 10750031 A1 20031229

parent continuation-of 10367489 20030214 US PENDING

child 10367489 20030214 US

parent division-of 09575384 20000522 US GRANTED

parent-patent 6633161 US

non-provisional-of-provisional 60135269 19990521 US

INT-CL-PUBLISHED: [07] G01 V 3/00

US-CL-PUBLISHED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

REPRESENTATIVE-FIGURES: 1B 5A

ABSTRACT:

An RF coil suitable for use in imaging systems is provided which coil has a dielectric filled cavity formed by a surrounding conducting enclosure, the conducting enclosure preferably being patterned to form continuous electrical paths around the cavity, each of which paths may be tuned to a selected resonant frequency. The patterning breaks up any currents inducted in the coil and shortens path lengths to permit higher frequency, and thus higher field strength operation. The invention also includes improved mechanisms for tuning the resonant frequency of the paths, for selectively detuning the paths, for applying signal to the coil, for shortening the length of the coil and for controlling the field profile of the coil and the delivery of field to the object to the image.

## RELATED APPLICATIONS

[0001] This application is a continuation of U.S. patent application Ser. No. 10/367,489, filed Feb. 14, 2003, entitled "RF Coil for Imaging System," by J. T. Vaughan, which application is a divisional of U.S. patent application Ser. No. 09/575,384, filed May 22, 2000, now issued Patent No. 6,633,161, (Oct. 14, 2003), entitled "RF Coil for Imaging System," by J. T. Vaughan, which application claims the benefit of U.S. Provisional Patent Application Serial No. 60/135,269, filed May 21, 1999, entitled "RF Coil for Imaging System," by J. T. Vaughan, each of which is incorporated herein by reference.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	Keywords	Drawings
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☐ 11. Document ID: US 6633161 B1      Relevance Rank: 40

L23: Entry 15 of 30

File: USPT

Oct 14, 2003

US-PAT-NO: 6633161

DOCUMENT-IDENTIFIER: US 6633161 B1

TITLE: RF coil for imaging system

DATE-ISSUED: October 14, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Vaughan, Jr.; J. Thomas	Stillwater	MN		

## ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
The General Hospital Corporation	Boston	MA			02

APPL-NO: 09/575384      [PALM]

DATE FILED: May 22, 2000

## PARENT-CASE:

RELATED APPLICATIONS This application claims the benefit of U.S. patent application Ser. No. 09/575,384, filed May 22, 2000, entitled "RF Coil for Imaging System," by J. T. Vaughan, which application claims the benefit of U.S. Provisional Patent Application Serial No. 60/135,269, filed May 21, 1999, entitled "RF Coil for Imaging System and Use Therein," by J. T. Vaughan, each of which is incorporated herein by reference.

INT-CL-ISSUED: [07] G01 V 3/00

US-CL-ISSUED: 324/318; 324/322

US-CL-CURRENT: 324/318; 324/322

FIELD-OF-CLASSIFICATION-SEARCH: 324/318, 324/322, 324/312, 324/316, 324/300, 324/306, 324/307, 324/309

See application file for complete search history.

## PRIOR-ART-DISCLOSED:

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L23: Entry 12 of 30

File: USPT

May 24, 2005

DOCUMENT-IDENTIFIER: US 6898454 B2

TITLE: Systems and methods for evaluating the urethra and the periurethral tissues

Abstract Text (1):

The present invention provides systems and methods for the evaluation of the urethra and periurethral tissues using an MRI coil adapted for insertion into the male, female or pediatric urethra. The MRI coil may be in electrical communication with an interface circuit made up of a tuning-matching circuit, a decoupling circuit and a balun circuit. The interface circuit may also be in electrical communication with a MRI machine. In certain practices, the present invention provides methods for the diagnosis and treatment of conditions involving the urethra and periurethral tissues, including disorders of the female pelvic floor, conditions of the prostate and anomalies of the pediatric pelvis.

Brief Summary Text (3):

The invention relates in general to magnetic resonance imaging (MRI), and in particular to devices for in vivo MRI.

Brief Summary Text (12):

Evaluation of incontinence presently relies upon routine diagnostic tools such as history and physical examination, combined with specialized studies such as cystometrogram, electrophysiologic sphincter testing, bladder and renal ultrasound, cystourethroscopy, uroflowmetry, and videourodynamic evaluation. Ultrasound has been used transurethrally to evaluate the anatomy and function of the rhabdosphincter in the male urethra. Transvaginal ultrasound and intraurethral ultrasound have been employed in female patients also, to evaluate urinary incontinence.

Brief Summary Text (13):

The advent of intracavity magnetic resonance imaging (MRI) receiver coils for high-resolution clinical imaging of the prostate and of the uterine cervix has shown some promise as a technique for imaging the pelvic floor with increased spatial resolution compared to images acquired with the MRI body coil alone. Driven by a motivation to further increase the signal-to-noise (SNR) ratio at the region of interest, authors have reported the value of these intracavitary coils in the detailed demonstration of the female pelvic anatomy and abnormalities using a transrectal imaging approach as well as transvaginal approach for imaging. External MRI of the urethra and pelvic floor has been carried out in female volunteers and patients to elucidate the relevant regional anatomy. Endorectal and external MRI investigation has also been carried out to evaluate abnormalities of the urethral and periurethral tissues. Despite these efforts, clinical and radiological evaluation of these areas remains difficult and not completely satisfying. Although high-resolution magnetic resonance imaging with phased array pelvic, endorectal and endovaginal coils has dramatically enhanced the ability to visualize abnormalities of the female urethral and periurethral tissues, discussion and controversy still continues about the anatomy of this region.

Brief Summary Text (16):

It is understood that diagnostic techniques may be combined with therapeutic techniques for pelvic conditions. A better understanding of regional and local

anatomy and an appreciation of the relevant pathology may facilitate accurate and effective treatment. There remains a need in the art for diagnostic techniques that are combinable with therapeutic modalities useful for malignant and nonmalignant conditions in the pelvic region.

Brief Summary Text (17):

Techniques of magnetic resonance imaging (MRI) or magnetic resonance spectroscopy (MRS), specialized radiofrequency (RF) may be applicable to these diagnostic and therapeutic problems. RF receiver coils may be placed at the region of interest to increase the signal-to-noise ratio (SNR) for better image (spectrum) quality in MRI or MRS. RF Receiver coils can broadly be separated into categories of volume coils, surface coils and endoluminal coils. Volume coils contain the region of interest within their volume and the imaging region is directed toward the inside of the coil. Surface coils are placed on top of the region of interest and their imaging region is directed to either side of the coil. Endoluminal coils are inserted into natural (urethra, prostate, vagina, rectum, oesophagus, pancreas, etc.) or artificial (endovascular, etc.) orifices of the human or animal body. Their imaging region is directed towards the outside of the coil to provide high-resolution imaging (spectra) of the region surrounding the coil. Different coil designs for a potential endoluminal application are available in the art. The endoluminal RF coils designs exist in multiple forms, including: rigid (GE prostate biopsy guidance coil, (R. D. Watkins, K. W. Rohling, E. E. Uzgirir, C. L. Dumoulin, R. D. Darrow and R. O. Giaquinto, "Magnetic Resonance Image Guided Biopsy in Prostate", page 412, Book of Abstracts, ISMRM 2000), flexible (Atalar, E., P. A. Bottomley, and E. A. Zerhouni, Method of Internal Magnetic Resonance Imaging and Spectroscopic Analysis and Associated Apparatus, Assignee: Johns Hopkins University: U.S. Pat. No. 5,699,801, Dec. 23, 1997), and others. A quadrature/phased array endo-luminal design was also disclosed earlier (Atalar, U.S. Pat. No. 5,699,801).

Brief Summary Text (18):

However, there remains a need for providing high SNR and increased signal homogeneity in endocavitary designs. Mutual inductance between two or more independent but geometrically adjacent coils, tuned to the same resonance frequency may under certain circumstances improve the SNR and signal homogeneity, but such designs can also result in coupling between the coils that might result in poor signal performance and decreased signal penetration depth into the tissue. Usually, this mutual inductance is compensated for by adding combinations of capacitors, inductors, and/or other electronic elements to the resonant circuit of the coils. Another means of compensation is, to mechanically align the two or more coils in a way to each other, so that the coils are geometrically isolated from another.

Brief Summary Text (19):

Geometric decoupling, however, does not always result in sufficient isolation. The overall coil performance might be still degraded due to residual coupling between the coils. However, there has been no simple method of eliminating coupling between elements of these types of designs taught, thereby impeding the clinical uses of such devices. The use of a metallic paddle to steer the magnetic flux of a coil as a means to insulate two or more adjacent coils from each other was published in the literature in 1946 by Bloch, Hansen and Packard (F. Bloch, W. W. Hansen, M. E. Packard, Phys. Rev. 70:474 (1946)) and was then reconsidered by Andrew (E. R. Andrew, Nuclear Magnetic Resonance. Pp.56-63, Cambridge Univ. Press, London, (1955)) and then by Hoult et al. (D. I. Hoult, C. N. Chen, V. J. Sank, Quadrature detection in the laboratory frame. Magn. Reson. Med. 1, 339-353 (1984)). In these publications, however, a rather small paddle was used to decouple large volume coils from one another, to minimize distortions of the B.sub.1 field homogeneity to the inside of the coil. The application of such a paddle to an 'inside out' design of endoluminal coils, as first described in this report, enabled the paddle to be inserted into the most sensitive region between the coils. Furthermore, the paddle could be designed larger relative to the size of the coils, providing a very effective means of coil insulation, virtually without affecting the B.sub.1 field



toward the outside of the coil. No additional electronics were required to achieve an isolation of about 50 dB. Signal homogeneity as well as signal penetration depth and therefore image quality was markedly improved by minimizing the mutual inductance between the coils. There remains a need in the art, therefore for a means to minimize the mutual inductance between two or more independent RF transmit or receive coils in MRI or MRS that is simple to implement and effective. There is a further need to device a RF coil for endoluminal applications that can improve signal homogeneity and signal penetration depth.

Brief Summary Text (21):

In one aspect, the present invention provides an apparatus for magnetic resonance imaging of an anatomic region of a human pelvis. In one embodiment, and apparatus according to the present invention may provide an endourethral magnetic resonance imaging coil comprising an antenna, and interface circuit interposed between the antenna and a MRI machine, said interface circuit being in electrical communication with the antenna and being in electrical communication to the MRI machine and comprising a tuning-matching circuit, a decoupling circuit and a balun circuit, and a housing enveloping the antenna. The antenna may be formed on a flexible circuit. The interface circuit may be enclosed within an interface box connected to the antenna by a connector. The antenna may be a receive-only coil. The tuning-matching circuit may comprise at least two sets of capacitors, a first set in series and a second set in parallel. The decoupling circuit may comprise a PIN diode. The interface circuit may further comprise a DC regulating circuit. The housing may be sealed at a distal end. In this embodiment and in all embodiments of the present invention, the electrical communication between the interface circuit and the MRI machine may be made using a wireless connection, and in certain other embodiments of the present invention, the electrical communication between the interface circuit and the antenna may be made using a wireless connection.

Brief Summary Text (22):

In another aspect, the invention provides an apparatus for magnetic resonance imaging (MRI) of an anatomic region of a human pelvis, comprising an endourethral magnetic resonance imaging coil system, comprising a first antenna and a second antenna, wherein said second antenna is oriented at a preselected position with respect to said first antenna; and further comprising an interface system interposed between a MRI machine and said first and second antennas, said interface system being in electrical communication with said MRI machine and with each of said first antenna and said second antenna, said interface system comprising a tuning-matching system, a decoupling system and a balun system; and further comprising a housing enveloping at least one of said first antenna and said second antenna.

Brief Summary Text (23):

In yet another aspect, the present invention provides a system for treating an anatomic region within a pelvis of a patient, comprising an elongate member insertable into a urethra of the patient and temporarily retainable in said urethra, said elongate member housing an endourethral imaging system and an endourethral therapeutic system, wherein said endourethral imaging system comprises an endourethral MRI coil comprising an antenna, and said endourethral therapeutic system comprises an endourethral delivery device to deliver a mode of therapy transurethrally to an area of the anatomic region imaged by the endourethral imaging system; and further comprising an interface circuit interposed between said antenna and a MRI machine, said interface circuit being electrical communication with said antenna and being in electrical communication with the MRI machine, said interface circuit comprising a tuning-matching circuit, a decoupling circuit and a balun circuit.

Brief Summary Text (24):

In one aspect, the present invention may provide methods for treating an anatomic region within a pelvis of a patient. In one practice of the method, steps include

providing a medical device comprising an elongate member insertable into and temporarily retainable within a urethra of the patient, said elongate member housing an endourethral imaging system and an endourethral therapeutic system, wherein said endourethral imaging system comprises an endourethral MRI coil comprising an antenna, and said endourethral therapeutic system comprises an endourethral delivery device to deliver a mode of therapy transurethrally to an area of the anatomic region imaged by the endourethral imaging system; providing an interface circuit interposed between said antenna and a MRI machine, said interface circuit being in electrical communication with said antenna and being in electrical communication with the MRI machine, said interface circuit comprising a tuning-matching circuit, a decoupling circuit and a balun circuit; providing the MRI machine; inserting said elongate member into the urethra of said patient; temporarily retaining said elongate member in said urethra; positioning the pelvis of the patient in a diagnostically effective position relative to the MRI machine; using the MRI machine to excite magnetic resonance signals within tissues surrounding the anatomic region; applying gradient magnetic pulses to said human pelvis to spatially encode the magnetic resonance signals; receiving said magnetic resonance signals in said endourethral MRI coil and producing responsive output signals therefrom; processing said output signals to obtain an image of the anatomic region; identifying an area of the anatomic region to be treated; positioning the endourethral therapeutic system in therapeutic proximity to the area; and delivering transurethrally the mode of therapy to said area using said transurethral delivery device. As used herein, temporarily retaining the elongate member in the urethra refers to any temporary retention, no matter how long or short in duration, which is adequate to accomplish some aspect of the diagnostic or therapeutic procedures of the method. Temporary retention permits the elongate member to be repositioned in a different position during the course of diagnosis or treatment. Positioning the pelvis of the patient in a diagnostically effective position will be understood to practitioners of the MRI art to relate to the proper positioning of the body part to be imaged with respect to the main MRI machine. Positioning the endourethral therapeutic system in therapeutic proximity to the area will be understood by practitioners in the art to refer to any positioning from whence the endourethral therapeutic system may deliver a therapeutically effective amount of the mode of therapy to the area of the anatomic region to be treated.

Brief Summary Text (25):

In another aspect, the present invention may provide methods of evaluating an anatomic region of the human pelvis. In one practice, the method may comprise providing an endourethral MR receiver coil having an antenna disposed upon a flexible circuit, providing an interface circuit in electrical communication with said antenna, said interface circuit comprising a tuning-matching circuit, a decoupling circuit, and a balun circuit, providing a housing enveloping the antenna, providing an MRI machine in electrical communication with the interface circuit, inserting the endourethral MR receiver coil into a human urethra within the human pelvis, situating the human pelvis within a main magnetic field of the MRI machine, imposing the main magnetic field on the human pelvis, applying RF pulses to the human pelvis to excite magnetic resonance signals within the human pelvis, applying gradient magnetic pulses to the human pelvis to spatially encode the magnetic resonance signals received resonance signals in the endo urethral MR receiver coil, emitting responsive output signals from the endourethral MRI receiver coil, processing the output signals and converting them to information about the anatomic region of the human pelvis, thereby to evaluate the anatomic region.

Brief Summary Text (26):

The systems and methods of the present invention may be directed to a male or to a female subject. In one aspect, these systems and methods may be directed towards the diagnosis of an abnormality of the prostate. In another aspect, these systems and methods may be directed towards the diagnosis of an abnormality of the female

pelvic floor. Coils designed for the male or the female urethra may include specific features adaptable to male or female regional anatomy. Two different coil designs for intraurethral positioning may be included as embodiments of the present invention: a) single-loop coil, and b) quadrature coil. A balun circuit may be implemented into the design of both coils to reduce potential RF heating effects and to improve coil performance. An image intensity correction (IIC) algorithm may be used to compensate for the B.sub.1 signal variation of the endoluminal coils across the small field of views (FOV's) being used.

Drawing Description Text (6):

FIG. 4 provides a schematic diagram of a balun assembly.

Drawing Description Text (8):

FIG. 6 provides an electrical schematic of an embodiment of an imaging coil and interface circuit.

Drawing Description Text (9):

FIG. 7 provides a schematic view of an imaging coil embodiment.

Drawing Description Text (10):

FIG. 8 provides a cross-sectional view of the lumen with an imaging coil therein.

Drawing Description Text (11):

FIGS. 9A and B provide longitudinal and transverse cross-sections of an embodiment of an imaging coil system.

Drawing Description Text (12):

FIGS. 10A and B provide schematic electrical diagrams of a single imaging coil and interface circuit and a double imaging coil and interface circuit.

Drawing Description Text (13):

FIGS. 11A and B provide a schematic longitudinal and cross-sectional view of two imaging coils combined with a decoupling paddle.

Drawing Description Text (14):

FIG. 12 provides a schematic electrical diagram of two imaging coils and interface circuits combined with a decoupling paddle.

Drawing Description Text (15):

FIG. 13A-D provide longitudinal and cross-sectional views of folded and expanded decoupling paddles.

Drawing Description Text (16):

FIG. 14 provides a schematic diagram of a remotely manipulable decoupling paddle.

Drawing Description Text (17):

FIGS. 15A and B provide a schematic diagram of an embodiment of an imaging coil adapted for use in a male urethra.

Drawing Description Text (20):

FIG. 18 depicts an endourethral imaging system combined with RF ablation.

Drawing Description Text (21):

FIG. 19 depicts an endourethral imaging system combined with laser ablation.

Detailed Description Text (9):

Evaluation of the urethra in female and male patients presents challenging clinical and radiological problems. The ability to image the urethra in higher resolution than currently clinically available may permit more satisfactory investigation of incontinence and other urethral abnormalities. Contributing to the investigation of

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Set Items Description

S1 4521 S AU=(GROSS P? OR GROSS, P?)

S2 2011429 S MRI OR MAGNETIC(1W)(IMAG? OR IMAGING) OR MAGNETIC(W)RESONAN? OR NMR OR NUCLEAR()MAGNETIC()RESONANCE OR FTNMR OR FTMRI

S3 185712 S MAGNETORESONANCE OR PMR OR PROTON(W)MAGNETIC(W)RESONAN? OR MR()(IMAGE? OR IMAGING)

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S7 2085973 S S2:S5

S8 561415 S RADIO()FREQUENC? OR RF? ?

S9 642497 S ANTENNA? ?

S10 5989 S DECOUPL?(2N)(CIRCUIT? OR MODE? ?)

S11 44298 S END(2N)TERMINAL?

S12 12130 S BIAS(2N)POTENTIAL?

S13 5006136 S SWITCH? OR ALTERNAT? OR TOGGLE?

S14 37091 S S8 AND S9

S15 15 S S14 AND S10

S16 4 S S15 AND (S6 OR S7)

S17 4 RD (unique items)

S18 1 S S17 AND S1

S19 3 S S17 NOT S18

S20 140 S S8 AND S10

S21 0 S S20 AND S9 AND S12

S22 15 S S20 AND (S9 OR S12)

S23 14 RD (unique items)

S24 10 S S23 NOT S17

S25 1 S S10 AND S1

S26 2087727 S S6 OR S7

S27 154 S S26 AND S10

S28 51 S S27 AND (S8 OR S9 OR S11 OR S12)

S29 45 RD (unique items)

S30 41 S S29 NOT (S25 OR S24 OR S17)

S31 173 S S10(6N)S13

S32 2 S S8 AND S31

S33 2 RD (unique items)

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